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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,699	03/29/2004	Gregory E. Bottomley	4015-5177	1345

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EXAMINER	
LE, NHAN T	

ART UNIT	PAPER NUMBER
2618	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/811,699	BOTTOMLEY ET AL.	
	Examiner	Art Unit	
	NHAN T. LE	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 June 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-60* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *41-56* is/are allowed.

6)☒ Claim(s) *1,2,7,12-16,18-22,26,31,32,40,57,58 and 60* is/are rejected.

7)☒ Claim(s) *3-6,8-11,17,23-25,27-30,33-38,39 and 59* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 2, 7, 12-16, 18-22, 26, 31, 32, 35-37, 40, 57, 58, 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fitton et al (US 20040028013) in view of Smee et al (US 6,990,137) further in view of Shalvi et al (US 6,553,074).

As to claims 1, 21, 57, Fitton teaches a method of estimating an correlation in a spread spectrum wireless receiver comprising: estimating a first correlation (see fig. 5, numbers 514 1-N, paragraphs 0090-0094) based on despread symbols received over multiple paths of a multi-path channel; estimating a second correlation (see fig. 5, numbers 514 1-N, paragraphs 0090-0094) based on the despread symbols; and deriving a final correlation (see fig. 5, number 528, paragraphs 00900-0094) based on the first and second correlation. Fitton fails to teach wherein the correlation is the correlation matrix. Smee teaches wherein the correlation is the correlation matrix (see fig. 13, number 308, col. 22, lines 23-65. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teaching of Smee into the system of Fitton in order to trade off noise suppression through averaging and ability to track channel variation. The combination of Fitton and Smee fails to teach wherein the correlation is the impairment correlation. Shalvi teaches wherein the

correlation is the impairment correlation (see col. 6, lines 5-40). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teaching of Shalvi into the system of Fitton and Smee in order to improve the signal quality and data rate in the digital communication receivers.

As to claims 2, 22, 58, the combination of Fitton, Smee and Shalvi teaches wherein deriving the final impairment correlation matrix based on the first and second impairment correlation matrices comprises selecting one of the first and second impairment correlation matrices as the final impairment correlation matrix (see Fitton fig. 5, number 528, paragraphs 0090-0094).

As to claims 7, 26, the combination of Fitton, Smee and Shalvi teaches wherein estimating the second impairment correlation matrix based on the despread symbols comprises estimating the second impairment correlation matrix based on the first impairment correlation matrix (see Fitton fig. 5, number 528, paragraphs 0090-0094).

As to claims 12, 31, the combination of Fitton, Smee and Shalvi teaches comprising generating a despread error vector based on the despread values, wherein estimating the first and second impairment correlation matrices based on the despread symbols comprises estimating the first and second impairment correlation matrices based on the despread error vector (see Smee fig. 9, number 244, col.20, lines 35-65, col. 21, lines 55-67, col. 22, lines 1-22).

As to claim 13, the combination of Fitton, Smee and Shalvi teaches wherein estimating the first impairment correlation matrix based on the despread symbols comprises determining channel estimates based on the despread symbols (see Fitton

paragraphs 0080-0088) and estimating a parametric impairment correlation matrix based on the channel estimates (see Fitton fig. 5, number 528, paragraphs 0090-0094).

As to claims 14, the combination of Fitton, Smee and Shalvi teaches wherein estimating the second impairment correlation matrix based on the despread symbols comprises estimating a non-parametric impairment correlation matrix based on the despread symbols (see Fitton fig. 5, number 528, paragraphs 0090-0094).

As to claim 15, the combination of Fitton, Smee and Shalvi teaches further comprising generating weighting factors based on the final impairment correlation matrix and combining traffic despread symbols using the weighting factors to suppress interference (see Fitton fig. 5, number 528, paragraphs 0090-0094).

As to claim 16, the combination of Fitton, Smee and Shalvi teaches further comprising estimating a signal-to-interference ratio based on the final impairment correlation matrix (see Fitton fig. 5, number 528, paragraphs 0090-0094).

As to claim 18, the combination of Fitton, Smee and Shalvi teaches wherein the spread spectrum wireless receiver comprises a RAKE receiver (see Fitton fig. 5, paragraphs 0090-0094).

As to claims 19, 40, 60, the combination of Fitton, Smee and Shalvi teaches wherein the wireless spread spectrum receiver is disposed in at least one of a mobile station and a base station (see Fitton fig. 5, number 528, paragraphs 0090-0094).

As to claim 20, the combination of Fitton, Smee and Shalvi teaches wherein estimating the first and second impairment correlation matrices comprises determining channel estimates based on the despread symbols (see Fitton paragraphs 0080-0080)

and estimating at least one of the first impairment correlation matrix and the second impairment correlation matrix based on the channel estimates (see Fitton paragraphs 0090-0094).

As to claim 32, the combination of Fitton, Smee and Shalvi teaches wherein the first correlation estimator is a parametric estimator and wherein the first impairment correlation matrix is a parametric impairment correlation matrix (see Fitton fig. 5, number 528, paragraphs 00900-0094).

Allowable Subject Matter

2. Claims 3-5, 6, 8-11, 17, 23-25, 27-30, 33-38, 39, 59 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claims 3, 38, 39, the applied references fail to teach wherein selecting one of the first and second impairment correlation matrices as the final impairment correlation matrix comprises selecting the first impairment correlation matrix as the final impairment correlation matrix when a color of the first impairment correlation matrix meets or exceeds a predetermined color criteria as cited in the claim.

As to claims 4, 23, 59, the applied references fail to teach wherein selecting one of the first and second impairment correlation matrices comprises combining the first and second impairment correlation matrices as cited in the claim.

As to claim 5, the applied references fail to teach wherein combining the first and second impairment correlation matrices comprises: subtracting a filtered version of the

first impairment correlation matrix from the second impairment correlation matrix to generate a residual correlation matrix; and adding the residual correlation matrix to the first impairment correlation matrix to derive the final impairment correlation matrix as cited in the claim.

As to claims 6, 25, the applied references fail to teach wherein deriving the final impairment correlation matrix from the first and second impairment correlation matrices comprises: subtracting a filtered version of the first impairment correlation matrix from the second impairment correlation matrix to generate a residual correlation matrix; filtering the residual correlation matrix; augmenting the first impairment correlation based on the filtered residual correlation matrix to generate an augmented correlation matrix; and deriving the final impairment correlation matrix based on the augmented correlation matrix as cited in the claim.

As to claims 8, 27, the applied references fail to teach wherein deriving the final impairment correlation matrix based on the first and second impairment correlation matrices comprises: computing a whitening matrix based on the first impairment correlation matrix; applying an inverse of the whitening matrix to the second impairment correlation matrix to generate a final residual correlation matrix; and combining the first impairment correlation matrix with the final residual correlation matrix to derive the final impairment correlation matrix as cited in the claim.

As to claims 9, 29, the applied references fail to teach wherein deriving the final impairment correlation matrix based on the first and second impairment correlation matrices comprises: computing a whitening matrix inverse based on the first impairment

correlation matrix; applying the whitening matrix inverse to the second impairment correlation matrix to generate a final residual correlation matrix; augmenting the first impairment correlation matrix based on the final residual correlation matrix to generate an augmented correlation matrix; and deriving the final impairment correlation matrix based on the augmented correlation matrix as cited in the claim.

As to claim 10, the applied references fail to teach wherein estimating the second impairment correlation matrix based on the first impairment correlation matrix comprises: generating a whitening matrix based on the first impairment correlation matrix; computing a whitened error vector based on the whitening matrix; and estimating the second impairment correlation matrix based on the whitened error vector as cited in the claim.

As to claim 17, the applied references fail to teach wherein estimating the first and second impairment correlation matrices comprises estimating the first and second correlation matrices for multiple time slots of a received signal, and wherein deriving the final impairment correlation matrix based on the first and second impairment correlation matrices comprises selecting the first impairment correlation matrix as the final impairment correlation matrix for the time slots when a color of the first impairment correlation matrix meets or exceeds a predetermined color criteria as cited in the claim.

As to claim 28, the applied references fail to teach wherein the correlation processor comprises a converter to apply an inverse of a whitening matrix to the second impairment correlation matrix to generate a final residual correlation matrix, wherein the first correlation estimator applies the final residual correlation matrix to the first

impairment correlation matrix to generate an augmented correlation matrix and wherein the correlation processor derives the final impairment correlation matrix from the augmented correlation matrix as cited in the claim.

As to claim 33, the applied references fail to teach wherein the parametric estimator comprises: a correlation computer for measuring impairment correlations based on the despread values; a structure element computer for determining structured elements of an impairment model based on channel estimates; a parameter estimator for determining model fitting parameters based on the structured elements and the measured impairment correlations; and an impairment correlation calculator for calculating the first impairment correlation matrix based on the model fitting parameters and the structured elements as cited in the claim.

As to claim 35, the applied references fail to teach wherein the second correlation estimator is a non-parametric estimator and wherein the second impairment correlation matrix is a non-parametric impairment correlation matrix as cited in the claim.

3. Claims 41-56 are allowed over the prior art

The following is a statement of reasons for the indication of allowable subject matter:

Regarding independent claim 41, Grant et al (20050195889) teaches successive interference cancellation in a generalized rake receiver architecture; Smee et al (US 6,990,137) teaches system and method for received signal prediction in wireless communication system; Filton et al (US 20040028013) teaches receiver processing system; Shalvi et al (US 6,553,074) teaches method and device for combating line

impairment. The teaching of the prior art either combined or alone fails to teach combining the spread symbols using weight factors determined from the final impairment correlation matrix to suppress the interference.

Dependent claims 42-48 are allowable for the same reason.

Regarding independent claim 49, Grant et al (20050195889) teaches successive interference cancellation in a generalized rake receiver architecture; Smee et al (US 6,990,137) teaches system and method for received signal prediction in wireless communication system; Filton et al (US 20040028013) teaches receiver processing system; Shalvi et al (US 6,553,074) teaches method and device for combating line impairment. The teaching of the prior art either combined or alone fails to teach estimating the signal-to-interference ratio based on the final correlation matrix.

Dependent claims 50-56 are allowable for the same reason.

Response to Arguments

4. Applicant's arguments with respect to claims 1-60 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Le whose telephone number is 571-272-7892. The examiner can normally be reached on 08:00-05:00 (Mon-Fri).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on 571-272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nhan T Le/
Patent Examiner, Art Unit 2618
Nhan T. Le